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Proximate body composition of five commercial fish species of family Cyprinida ecommonly consumed in Swat Khyber Pakhtunkhwa Pakistan

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Abstract
Five fresh water fishes namely *Barilius pakistanicus; Garra gotyla; Carassius auratus; Schizothorax plagiostomus and Schizothorax labiatus* were studied to assess proximate body composition namely moisture, fats, ash and protein content. The fish species were collected from river Swat during a period from April to August 2016 and transported to the department of zoology University of Peshawar Pakistan where weighted and biochemical analysis were carried out. The average moisture contents was (58.133 to 72.133) fats was (1.0000 to 6.0000), ash was (3.3333 to 8.0000) and protein was (14.667 to 22.667). The mean value of body constituents were statistically significant (P<0.05).This study showed that all the five fish species of family Cyprinidae are a good source of protein, while it is recommended for human health because of fewer fats in its body as compared to the other edible mass

Keywords: Family cyprinidae, protein, fats, ash, moisture

1. Introduction
Fish contain essential protein and other vital nutrients that are broadly consumed by all the people [1]. Fish meat is favored because it contains low lipids and has high water as compared to beef or chicken meat [2].Polyunsaturated fatty acids of fish have preventive and curative effects for several diseases such as cancers, inflammatory diseases and arterial hypertension [3]. Various species of fish do not provide the same nutrients to their consumers [4]. Differences in the proximate compositions of different fish species may be accredited to sex, size, age, habitats, feeding of food and feeding rate [5].The main body constituents of fish include protein, lipid, ash and water. Carbohydrates and non-protein compounds are also important constituents but are present in small amounts and are usually ignored during analysis [6, 7]. Fish meat is favored because it contains low lipids and has high water as compared to beef or chicken meat [8]. Not only this, fish is also demanded on high rate feed. Although information related to chemical nature of freshwater fishes in general is valuable to nutritionists and is concerned with readily available source of low fat, high protein and more water [9]. The variation in the chemical nature is just due to the fact that these species belong to different location while age variation, season and maturity in the same species may also contribute to the significant differences in the total lipids [10]. The information about fats, proteins and minerals contents and how they show variation to size and condition factor are of great importance for the fish used as a food by consumers. It also facilitates the selection of nutritive species which have optimum size and more protein components. These are certain information's that help the overall technique and are very helpful in aquaculture [11]. This research work was undertaken to evaluate the composition of different fish species of river Swat Khyber Pakhtunkhwa Pakistan.

2. Material and methods
River Swat originates at kalam with the confluence of Ushu and Utror River and flow for about 160 kilometer across the valley up to Chakdara. The total length of river is 250 kilometer from Kalam to near Charsada. Many large and small tributaries join the river along its course. Fish sample like *Barilius pakistanicus*, *Garragotyla*, *Carassius auratus*, *Schizothorax plagiostomus* and *Schizothorax labiatus* constitute the key materials for this research work. All the species were collected using various types of nets such as cast nets and hand nets from different region of river Swat from April to August, 2016. The species were

identified in the laboratory of Zoology Department University of Peshawar with the help of key Regan [12] Fowler [13] and after that all the fish species were weight through electronic digital balance LP 503. The fish was placed in the oven (memmert 854, Schwabach, W –Germany) to dry at 48-50ºC for 48 -72 hours until the moisture was completely lost. Then the sample was weighed on an electronic digital balance (Chyo, Japan). The ash content was determined by burning the samples for about 6 hour at 400-600ºC in a muffle furnace. (%) of ash was calculated as by the following equation: (%) of ash = (Weight of ash / Weight of Sample) × 100. The proteins were identified by Kjeldahl technique [14] and lipids content was determined by Bligh and Dyer Method [15].

2.1 Statistical Analysis
All the data were analyzed by using statistical package for social sciences (SPSS) software. LSD test at 5% level of significance.

3. Results
3.1 Body weight
Mean data for body weight of all the species were *Barilius pakistanicus* (22.30), *Garra gotyla* (23.60), *Carassius auratus* (20.47), *Schizothorax plagiostomus* (29.53) and *Schizothorax labiatus* (26.3).*Schizothorax plagiostomus* showed maximum mean value (29.53) followed by *Schizothorax labiatus* (26.3) while, *Carassius auratus* showed minimum mean value (20.47) followed by *Barilius pakistanicus* (22.30) (Table 1). Statistically it is proved that the data regarding total weight of all the species collected from different region of river Swat were significant (P<0.05).

Table 1: Mean weight of all different fish species

Species	Family	Local name	Weight in gram
Barilius pakistanicus	Cyprinidae	Pakistani chilwa	22.30
Garra gotyla	Cyprinidae	Patharchatt	23.60
Carassius auratus	Cyprinidae	Gold fish	20.47
Schizothorax plagiostomus	Cyprinidae	snow trout	29.53
Schizothorax labiatus	Cyprinidae	Swati fish	26.3

3.2 Moisture content
Table 2 shows some variations in the moisture content of various fish species. *Garra gotyla* showed the highest mean moisture with a value of (72.133), while the least mean moisture concentration was recorded in the *Barilius pakistanicus* (58.133). A value of (69.733), (59.733), (72.067) was recorded for the fish species *Carassius auratus*, *Schizothorax plagiostomus* and *Schizothorax labiatus* respectively. Comparison of mean moisture content of all the fish species recorded significant difference (P<0.05)

3.3 Fat content
Garra gotyla recorded the highest fats value of 6.0000 followed by (4.3333), (4.3333), (2.5000) for the fish species *Carassius auratus*, *Schizothorax labiatus* and *Schizothorax plagiostomus* respectively. The least fats content was recorded in *Barilius pakistanicus* with a value of (1.0000) respectively. Mean values of fats among different fish species were found statistically significant (P<0.05).

3.4 Ash content
Various fish species showed a great significant (P<0.05) difference in the ash contents (Table 2). Maximum ash content was observed in the *Garra gotyla* followed by *Schizothorax labiatus*, while the minimum values were recorded in the *Carassius auratus*. Interspecies comparison revealed that all the species significantly differed from each other in ash contents. *Barilius pakistanicus* and *Schizothorax plagiostomus* showed comparable trend with respect to ash content while other species showed a significant difference with one another.

3.5 Protein content
Comparison of the mean protein for all the fish species showed significant difference (P<0.05) (Table 2). *Carassius auratus* showed the maximum mean protein value (22.667) followed by *Barilius pakistanicus* (20.000). Comparable protein amount were also found in the *Schizothorax labiatus* and *Schizothorax plagiostomus* with a value of (18.000) and (15.333) respectively. The lowest amount of protein contents were observed in the *Garra gotyla* (14.667).

Table 2: Mean moisture, fats, ash and protein contents in different fish species

Species	Moisture	Fats	Ash	Protein
Barilius pakistanicus	58.133	1.0000	4.3333	20.000
Garra gotyla	72.133	6.0000	8.0000	14.667
Carassius auratus	69.733	4.3333	3.3333	22.667
Schizothorax plagiostomus	59.733	2.5000	4.6667	15.333
Schizothorax labiatus	72.067	4.3333	6.3333	18.000

4. Discussion
The biochemical analysis of edible parts of different fish species was carried out in order to
Find out the value of fish with regard to its quality and market value. Current study indicates that the body composition varied significantly among the various fish species. According to Jacobs (1951), the variations in the biochemistry of fish may be due to some factors like season, nature of fish food, habitat of the fish, size and age of the fish. The mean weight of *Barilius pakistanicus* and *Garra gotyla* showed no significance difference, while a great significant difference were observed in *Carassius auratus*, *Schizothorax plagiostomus* and *Schizothorax labiatus*. Moisture as a main constituent of the eatable portion of fish was also perceived by Almandos Yeannes [16]. Confirmed water as a key constituent of fish muscle followed by protein and fat [17]. However there is no information almost about the nutritional value of (Cyprinidae) fish family. The maximum moisture content was observed in *Garra gotyla*, while the minimum values were recorded in the *Barilius pakistanicus*. This is same for the fats contents also. The maximum fats content was observed in *Garra gotyla*, while the minimum were recorded in *Barilius pakistanicus*. It may be due to less intake of food as these fishes were captured during coldest days of the year. The percentage of water is also a upright indicator of its comparative content of energy, lipid and protein [18]. In all the species moisture content agreed with surveillance of [18], [19, 20]. Mean moisture content was found statistically significant (P<0.05). The variation in body composition suggested that the variable rearing environments within the different fish farm might influence body composition. This might be associated to the physiological adaptations of various fish species to adapt in different environment. Apart

from this; variation in the fat contents of the body also depends on temperature, water and difference in individual sex [21]. The highest value of ash content in the study population was observed in *Garra gotyla*, while *Carassius auratus* showed lowest ash contents in the study. At different time diet of the fish varies qualitatively and is therefore likely to cause differences in some body ingredients [22]. A significant difference (P<0.05) were observed in the protein contents among different fish. The values of fish body composition parameters vary considerably not only within and between species [23], but also with size and age [24], gender [24] and season [25]. This might be due to the collaboration of numerous factors like space, food, salinity, temperature and physical activity. However, in spite of the dissimilarities, the range of protein in different species of fish in this study shows that these fishes are good sources of protein to consumers.

5. Conclusion

It can be advised that size, taste, and cleanliness of fish should not be the only reasons to be considered in making choice for marketing and consumption of fishes. This information will be also valuable to the consumers in taking fish on the basis of their nutritional values. This study showed scientific evidence and comprehensive information of the proximate body composition of five species of family Cyprinidae that are commonly consumed in Swat Khyber Pakhtunkhwa, Pakistan.

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